Abstract

An optical isolator for transmitting light in a first direction along an optical pathway therethrough and blocking the light in a second direction along the optical pathway, and the first direction and the second direction being in opposition to one another, the optical isolator comprising:

an input polarizer and an output polarizer, the input polarizer having a first pass axis of a first given angle, the output polarizer having a second pass axis of a second given angle, the input polarizer configured to polarize the light entering into the optical pathway to a first given plane of polarization parallel to the first given angle;

a Faraday rotator material disposed between the input polarizer and the output polarizer, the Faraday rotator material having a given Verdet constant, a first end and a second end in opposition to one another, the first end and the second end disposed at a maximum linear distance across the Faraday rotator material from one another, and the first end and the second end defining an axis therebetween defining a

maximum linear length through the Faraday rotator material;

generation means for generating a magnetic field around and inside the Faraday rotator material, the generation means providing a given magnetic field strength; and

at least one reflector configured along the optical pathway from the input polarizer to the ouput polarizer, the at least one reflector defining a given optical length of the optical pathway through the Faraday rotator material, and the given optical length through the Faraday rotator material being longer than the maximum linear distance across the Faraday rotator material;

wherein the given length of the optical pathway through the Faraday rotator material provided by the at least one reflector, the given magnetic field strength provided by the generation means, and the Verdet constant of the Faraday rotator material are selected with respect to one another so as to rotate the light along the given length of the optical pathway through the Faraday rotator material from the

first given angle of the input polarizer to the second given angle of the output polarizer.